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ABSTRACT

A study was conducted to examine changes in the vocational choices of a national sample of junior-community college students. Holland's psychological classification scheme for vocations--realistic, investigative, conventional artistic, enterprising and social--were used. The dependent variable was constructed by comparing each student's fall, 1970, vocational choice on the Career Planning Profile to his or her spring, 1972, vocational choice on the Career Planning Profile Follow-up Questionnaire. Follow-up questionnaires were sent to and administered by the 62 participating institutions. A total of 4,592 completed questionnaires were returned. Application of four sample selection criteria resulted in a final sample of 2,928. Male changers tended to report more business detail competencies and score slightly higher on trade interests than male nonchangers. Female changers tended to report fewer science competencies and score slightly higher on business contact interests than female nonchangers. Aside from these differences, nonchangers did not differ greatly from changers. Variations were noted in the types of vocational choice change exhibited by individuals whose original choices were in different major categories. Of the 1,498 who changed major categories, 30% changed to the realistic category, 22.5% changed to the investigative category, and 19.7% changed to the social category. Changers differed very little from nonchangers on the interest, ability, and familial background variables. (KM)

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Vocational Choice Stability and Career Development

by

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Vocational Choice Stability and

Career Development

The general purpose of this study was to examine changes in the vocational choices of a national sample of junior-community college students. More specifically, the two basic purposes of this study were: (a) to examine the frequency and direction of individuals' changes in vocational choices, and (b) to determine the multivariate utility of a number of independent variables for distinguishing between those who, over the 18-month period, did not make a change in their vocational choice and those who did make a change in their vocational choice. An extensive literature review that covers the relationship between vocational choice stability and persons' abilities, interests, and personality has also been included.

Holland's psychological classification scheme for vocations (1966 a & b) was employed both for grouping vocational choices into six major categories and for classifying individual vocational choice changes into mutually exclusive groups. According to Holland's hexagonal model (Holland, Viernstein, Kuo, Karweit, & Blum, 1970) for interpreting inter- and intra-class relationships, vocational choices are (a) initially made in a fashion that is related to an individual's personality type, and (b) changed most frequently to geometrically near vocational choices. It is possible that the distance between any two occupations which comprise a change in vocational choice, in the hexagonal model, is inversely related to the frequency with which that change is made. The assumption here would be that when persons change their vocational choices

they are more likely to change to a closely related vocation than to a remotely related vocation. The present study was a test of the above-mentioned assumption. The first major purpose of this investigation was to examine the above-mentioned assumption.

The second major purpose of this study was to examine and delineate similarities among and differences between those individuals who, over the 18-month period encompassed by the study, did not change their expressed vocational choices, and individuals who did make some change in their expressed vocational choices. The purpose of examining changes in vocational choices was to facilitate early identification of individuals who, at a later point in time, made a change in vocational choice.

A number of studies of change in vocational choice have viewed change in terms of Holland's theoretical framework (Elton & Rose, 1970; Folsom, 1969; Holland et al., 1970; Holland & Lutz, 1967, 1968; Holland & Nichols, 1964; Holland & Whitney, 1968; Holland, Whitney, Cole, & Richards, 1968; Osipow, Ashby, & Wall, 1966). However, because of several limitations their findings have been restricted in terms of generalizability to the population at large. There are three basic reasons for these limitations. First, each of the above-mentioned, heretofore-completed studies has used primarily 4-year college and university students in its samples. The major significance of this fact is that individuals classified in most vocational classifications as "trade and industrial types" (Holland's Realistic category) were not included in the samples in the proportions that they should have been included if the samples were to have been representative of the general population--i.e. Realistic

individuals are simply not found in 4-year college populations in anywhere near the same proportions as they are found in the population at large. The restrictions that these discrepancies have placed on both the generalizability and the validity of the findings cannot be overlooked. Another reason for caution in generalizing from the above-mentioned studies is that with the exception of the Folsom (1969) study and the Osipow et al. (1966) study, neither of which were longitudinal studies, none of the studies encompassed more than a 12-month period of time. Clearly, Holland's theory needs to be longitudinally studied "for longer intervals of time . . . to learn if the findings hold for longer periods (Holland & Whitney, 1968, p. 18)." Due to the nature of vocational choice development it is also important to study the phenomenon over longer periods of time when using other models and/or other assumptions.

Research into the general phenomenon of vocational choice changes has typically failed to differentiate varying types or degrees of change. Holland and Lutz (1968) summed up this problem in a concise manner when they stated that since expressed vocational choice has usually been evaluated in terms of "identical" choices from an initial to some second point in time, "we have treated any change in vocational choice as a gross change and missed the opportunity to examine the different degrees of change that a useful classification reveals (p. 433)." The four categories of change in the present study, and the manner in which the data were analyzed, should add to our understanding of different "degrees of change" on a broader and more applicable basis. In addition, every attempt has been made in the present study to meet the above-mentioned limitations.

The substantial growth in the number of 2-year institutions has, from a research standpoint, been a very beneficial development. It has recently been shown that students attending junior colleges "are more representative of the population as a whole, rather than being skewed toward the middle and upper socioeconomic levels as is the case of student enrollees of four-year colleges and universities (Garbin & Vaughn, 1971, p. 178)." The fact that students in these environments seem to be more representative of the general population makes these groups of students much better suited for model testing than are groups of students from 4-year college and university environments.

Review of Literature

Studies regarding various aspects of vocational choice stability have been voluminous. Vocational choice is definitely influenced by a number of important variables. Included among these are ability, interest, and personality. The roles of these variables as described in recent research will be examined in this section.

It is important to remember that the stability of vocational choices, as reported in the literature, depends partially upon how the individual's choices were classified in the samples examined. For example, some studies which report very high rates of stability but, at the same time, only categorize the vocational choices into four or five very broad categories tend to conceal changes which have actually occurred. The result has been lack of precision concomitant with inflated stability rates and deflated change rates. Conversely, some studies which report very high rates of change, while categorizing the vocational choices into many categories, tend

to almost overemphasize minor changes. The result has been large degrees of precision accompanied by high change rates and low rates of stability. The first circumstance could be termed under-classification and the second could be termed over-classification. The problem with studies of the under-classification type has been twofold. First, vocational choices have been represented as being more stable than they probably are. Second, the usefulness, as well as the accessability of the data for further investigation and research has been reduced because of the loss in published precision: it can be very costly in terms of both time and resources to obtain another research project's original data for purposes of either regaining lost precision or establishing the degree of comparability with other data sets. Over-classification studies have presented much less of a problem. Not only have they tended to represent the situation more accurately, but also they have made it less difficult for other researchers to re-examine the data and verify reported results and conclusions.

Studies of major- or vocational-field transfer indicate that, in general, between one-fourth and one-half of postsecondary students change programs sometime during their undergraduate education. In spite of the documented differences between, as well as the similarities among, background characteristics of junior college (2-year) students and liberal arts (4-year) students (Cross, 1968; Scott & Fenske, 1972) a brief treatment of several relatively well-known and commonly hypothesized reasons for changes should be helpful. Most of the following theories have been based upon 4-year college and/or university samples. One line of thought holds that changes are the result of attempts by students to "match" themselves with what they perceive to be the characteristics of

students in other fields. Over a period of time this process leads to what Feldman and Newcomb (1969) call "accentuation." The accentuation process, Feldman contends, eventually increases both the perceived and the actual differences between students in different major fields. Festinger (1964) proposes a similar theoretical philosophy termed "cognitive dissonance." Festinger explains the same phenomenon of change in terms of reducing cognitive dissonance. Another theory is that those who change major fields share some very important characteristics which make them, as a group, much different from those who do not change major fields.

It has been common in studies of the stability of vocational choices to find that a large proportion of students change their vocational choice to another of Holland's six major categories (i.e., from an Artistic type of vocation to an Investigative type of vocation). This has been true of samples of students who were followed-up over varying periods of time even after minor fluctuations had been excluded. The changes were, however, not unexpected. In fact, they have been studied a number of times using longitudinal data; and the results have been relatively consistent with Holland's typology (Holland, 1963 a & b, 1968; Holland & Whitney, 1968; Osipow et al., 1966). Using less broad major field and/or first vocational choice areas, major-change rates of over 50% have been reported (Carmody & Shevel, 1972; Lutz, 1968; Scott & Fenske, 1972). Most of these changes, however, seemed to be in the expected direction--that is, the majority of the changes were of a nature that represented "small" psychological distances. Each of the studies referred to above encompassed time frames ranging from eight months to four years. However, the Holland and Whitney study (1968) was the only one that investigated the stability of students' vocational choices specifically in light of Holland's classification scheme.

There can be little doubt that a person's vocational choice is the product of a variety of environmental and experiential forces. Included among the forces that influence the selection of a vocation are· inherited aptitudes, abilities, characteristics, vocational opportunity, social class, and educational opportunity. It also appears likely that the group of "personal and impersonal forces that determines a person's 'initial' vocational choice apparently effects a change in vocational choice or field of training (Holland, Davis, & Cooley, 1967, p. 178)."

Flanagan and Cooley (1966) studied the relationship between ability and vocational choice using data from Project Talent. The data were obtained from a 1-year follow-up of 5,857 ninth-grade males who had originally planned careers in either the physical sciences, the biological-medical fields, the humanities, the business fields (both college and noncollege), or the technical fields. They concluded that "Neither ability nor motive measures were better predictors than simply asking the ninth-grade boy what he wanted to become (p. 204)." It was also their conclusion that the value of their multivariate prediction system was not the hit-rates that were obtained (38% for the ability measures and 42% for the motive measures). Its primary value was, in their opinion, that it made it possible to give the individual boys detailed information about the proportion(s) of boys, like himself, that would at some later date, likely find themselves in career plan groups other than the one in which they were already members. This type of information would probably have been instructive if for no other reason than it would have given the student assistance "in identifying those groups in which his probabilities of eventual group membership are the greatest and, conversely, those in which they are the least (p. 204)."

Cooley and Becker (1966), in a study of junior college students, concluded that, in terms of ability, these students tended to be more similar to noncollege youth than to youth attending 4-year institutions. However, it has also been reported that the academic ability of junior college students at some of these 2-year institutions was, on the average, well above the mean ability for students at some 4-year institutions (Hoyt & Munday, 1966).

Garbin and Vaughn (1971) found that vocational-technical students did not report high school grades that differed greatly from those reported by community-junior college transfer students. However, comparison of Garbin and Vaughn's self-reported grade distribution of community-junior college occupational students with those reported by Astin, Panos, and Creager (1967), revealed that, in general, 4-year college and university students achieved higher high school grades. Garbin and Vaughn further reported that on direct comparison of the high school grade averages of females and males, "Females appear to be clearly superior to males in the sample (p. 68-70)." This finding corresponds to reports by The American College Testing Program (1971, 1972) regarding their 1970 CPP National Norm Group's high school grade distributions. In every case, regardless of the subject area involved (i.e., English, math, social studies, natural sciences, business, or vocational), and regardless of the norms used (i.e., general norms, age 25 and older, part-time students, or Afro-American/Black), female students consistently reported higher high school grades than did males. Females, in the present investigation's sample, also tended to report higher grades than did males.

Osipow and Gold (1967) found that the verbal ability of students who expressed consistent first and second career preferences (at the same point in time) was significantly higher than the verbal ability of students who expressed

inconsistent first and second career preferences. The Scholastic Aptitude Test verbal (SAT-V) was used to measure verbal ability. The difference between the two groups' quantative ability (SAT-Q) was not large enough to be significant. Students in the consistent group were also significantly more certain of their career plans.

Stewart (1959) examined the interest patterns of a sample of high-achieving, high-ability students using the SVIB. He found that the interest patterns of high-ability males and females were quite similar. Taylor and Hanson (1972) found, using multiple discriminant analysis, that interests were of value in distinguishing between engineering majors who persisted in their major and engineering majors who transferred to some other major.

Holland and Lutz (1968) compared the utility of students' expressed vocational choices with the utility of the VPI for predicting choice of vocation. They reported "that the predictive efficiency of a student's expressed vocational choice is about twice that of the Vocational Preference Inventory (p. 428)." It was suggested that practitioners "should make greater use of a person's expressed vocational choices and that interest inventories should be used with more discrimination (p. 433)." The following recommendation was taken from Holland and Lutz (1968) but was also based upon findings of the Holland (1963b) study:

> If the present study and its predecessor are persuasive, then we could abandon the routine use of interest inventories in freshmen orientation programs and rely on what students tell us. Those students who are undecided or who give successive choices that fall in different vocational classes might be given the option of taking an interest inventory. In making predictions in vocational counseling, it may be constructive to rely more upon a person's vocational choice and history of such choices than upon interest inventories . . . .

> The potential values of this orientation need more investigation, but it seems unwise to continue to believe that interest inventories are always needed in the sense that one always needs a yearly physical examination (p. 433-444).

If the VPI were to prove useful in predicting various vocational outcomes, or in identifying certain types of individuals, then its continued large-scale use could more easily be justified.

Supporting evidence for the notion that personality styles and vocational choices are related has been reported by Osipow, Ashby, and Wall (1966) and by Stephens (1973). The former authors concluded that both were useful in the prediction of students' vocational behavior and in general counseling sessions. Stephens found a significant relationship between person's personalities and their job-seeking behaviors. Folsom (1969) reported that university students who had completed the College Student Description Questionnaire (CSDQ) in general described themselves in manners which agreed with the Holland typology when major field of study was used as the criterion of classification. The one exception to this reported agreement was for students classified as Enterprising. This supports the assumption made by Holland and Whitney (1968) that when students choose a vocation they, in effect, also group themselves into personality types. This assumption was based, in part, upon an earlier study by Holland and Nichols (1964) which investigated students' changes in major fields of study. This longitudinal study covered a 12-month period and included only high-ability students who were National Merit finalists. All students were classified into one of three mutually exclusive groups: nonchangers, intra-class changers, and inter-class changers. Their conclusion was that the "act" of not changing major fields appeared to be positively associated with possessing personal attributes that were commonly associated with students in that field,

and that changing major fields was similarly associated with discrepancies between the changer's attributes and those of other "typical students" in the original field of study. Remaining in a "given field appears to be associated with having personal attributes commonly associated with the typical student while leaving a field is related to dissimilarity between a student's attributes and those of the typical student (p. 235)."

Edwards and Whitney (1972) reported further empirical support for the validity of the manner in which the Holland hexagonal model arranged personality types. In spite of the information loss that resulted from a large reduction in the amount of variance accounted for by their configural analysis when they changed to a 2-dimensional space from an n-dimensional space (36% and 29% reduction in variance for males and females, respectively), the hexagonal model for the occupational scales was "approximately" replicated across all domains--i.e., "activities, competencies, self-ratings, and occupations (p. 136)." The model was more effective for males than for females.

Lutz (1968), in a 1-year follow-up study of students who had completed the ACT Student Profile Section (SPS) investigated the degree of accuracy of students' precollege responses for predicting their activities during their first year of college. The data indicated that, in general, about 50% of the students selected the same major field 1-year after initial enrollment, and that students who changed to other major fields were most likely to select a major from a closely related group. "The pattern for vocational choices closely followed that for major fields with a slightly higher rate of change (p. 10)." The major difference was that vocational choice changers were more likely to either select "undecided" or not to respond to the item, than they were for the major field data. Twenty-one percent of the 4-year college and university males who completed the follow-up

instrument, and were originally in the arts and humanities fields, either failed to respond to the vocational choice item, or were undecided. "About one-quarter of the students who express initial preferences are undecided after one year, and only about one-quarter of the students change to another vocational choice (p. 11)." As a result of this investigation Lutz concluded that on the basis of SPS data "students do tend to do what they say they will do, or something closely related to it (p. 30)," despite a substantial degree of uncertainty with regard to vocational choice.

An even larger proportion of uncertainty than that reported by Lutz has been reported by Osipow et al. (1966). Their sample consisted of 108 decided, 91 tentative, and 29 undecided first-year students from Pennsylvania State University who had evaluated themselves according to Holland's six personality types. They found that "more than half the students represented a population with a substantial degree of vocational uncertainty (p. 42)."

Contradictory, as well as inconclusive results have been reported regarding differences in ability between students whose expressed vocational choices indicated that they were vocationally decided and students whose choices indicated that they were undecided. Elton and Rose (1971) conducted a longitudinal study of vocationally undecided male University of Kentucky seniors (n = 137). They were looking for differences in personality and/or ability between these undecided seniors and a larger group of persisting male University of Kentucky seniors (n = 986). The personality measures were obtained from the OPI and the ability measures were obtained from the ACT Assessment (the ACT' not the CPP). Six discriminant analyses were conducted--one for each of Holland's six categories. In these analyses, factor scores from the OPI and ACT Composite

Scores were used as independent variables. The dependent variable consisted of three groups. These groups were made up of (a) seniors who expressed vocational choices as freshmen and were undecided, (b) seniors whose choices remained the same, and (c) seniors whose choices differed. All variables failed to produce statistically significant chi squares in any of the six analyses. The authors admitted that these findings did not add much to what is known of differences between decided and undecided students. They postulated that a large contributing factor was that "most of those students who were undecided as freshmen did not survive to graduation. . . . three-fourths of the freshmen undecideds who did not survive were dismissed for academic reasons (p. 91)." Other studies have failed to reject the null hypothesis regarding the ability of decideds and undecideds (Baird, 1967; Sharf, 1967), while Holland and Nichols (1964) concluded that undecided National Merit finalists were, as a group, of higher ability than were decided National Merit finalists.

Rose and Elton (1971) compared vocationally undecided freshmen who persisted to college graduation with vocationally undecided 1966 freshmen who did not enroll for their fifth quarter (nonpersisters). Approximately one-third of the undecided freshmen graduated. The other two-thirds dropped out either voluntarily or involuntarily. In any case, the persisters were significantly higher in ability as measured by their ACT Composite Scores. In addition, it should be noted that the persisters at the university from which this sample

was drawn, as a group, had a mean ACT Composite Score of 22.9. This was slightly higher than the national average ACT Composite for students from the same type of institution which, in 1966, was 22.1 (Hoyt & Munday, 1968). The nonpersisters, as a group, had a mean ACT Composite of 20.9. This was below the national ACT Composite mean for students from the same type of institution.

Methodology

The instruments. The Career Planning Profile (CPP) was the primary instrument of this study. It was designed (a) to provide individual students with more information regarding their career plans, and (b) to provide institutions with more information about their incoming students than had previously been available to them. The instrument is a guidance-oriented system designed to collect, analyze, and summarize, for the student, information relating to his or her future career and educational options. It collects background information and assesses interests, abilities, career preferences, and goals.

The second instrument used in this study was the Spring, 1972, Career Planning Profile Follow-up Questionnaire (SCPP). The primary function of this instrument, as far as the present study was concerned, was to collect the post-measures of expressed vocational choice.

Administration of the instruments. All of the Career Planning Profile Follow-up Questionnaires were administered directly or indirectly by personnel from each of the 62 participating institutions (see Appendix A). Materials were sent via bulk mailings on March 1, 1972. This included suggested first and second cover letters. These were to be typed and sent on institutional letterhead along with the questionnaires to students who were not on campus. Two types of administration

procedures were suggested: (a) on-site administration of the SCPP to all currently enrolled students, and (b) a mail survey of all current and previously enrolled students. Most of the institutions showed a "moderate" level of interest and activity. A combination of the above two methods was common. Data collection ceased on May 5, 1972. A total of 4,592 completed questionnaires were returned from the 62 participating institutions.

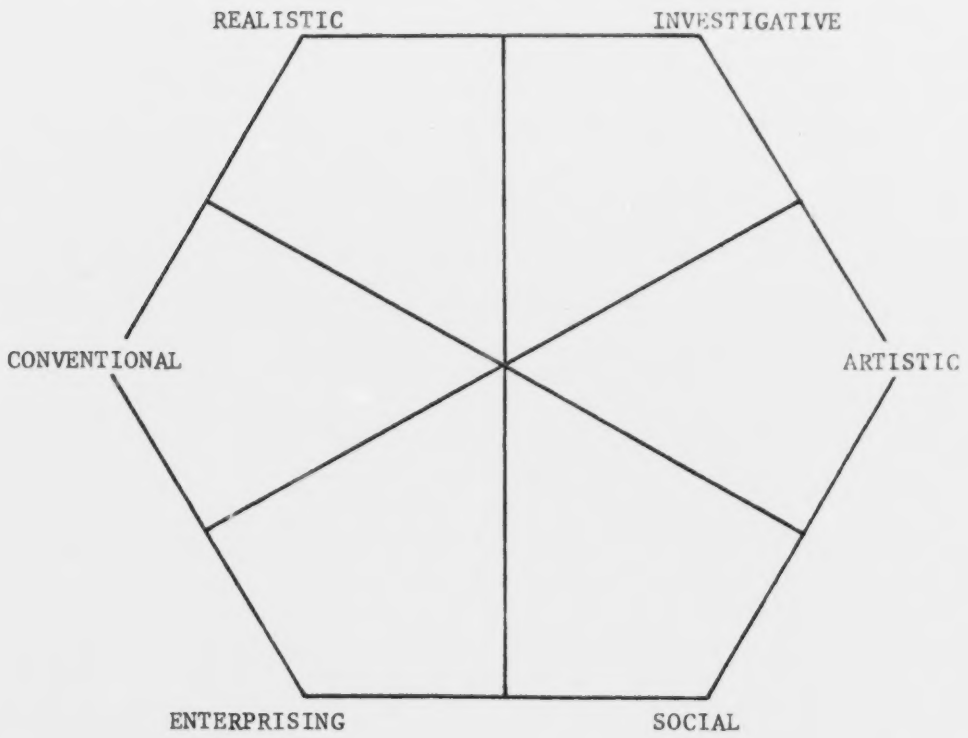
The independent variables. Variables included in the study were family income, father's level of education, mother's level of education, high school grade-point average, seven ability measures (these included mechanical skills, nonverbal reasoning, clerical skills, numerical computation, mathematical reasoning, space relations, and reading skills), four nonacademic competencies (these included arts, business contact, business detail, and science), eight interest scales (scientific, health, artistic, social service, business contact, business detail, trades, and technology), and sex. Sex was used both as an independent and as a control variable.

The dependent variable. The dependent variable was constructed by applying Holland's classification scheme to each student's fall, 1970, expressed vocational choice (first choice), and then to his spring, 1972, expressed vocational choice (first choice). Eighteen months separated these choices. But, more important, this period of time encompassed, for most of these youth, their first exposure to career training leading to a specific type of job. See Appendix B for a listing of the occupational alternatives from which individuals selected their choices.

The groupings or categories were defined by examining the arrangements of the occupations within the hexagon (see Figure 1) and the various types of vocational choice changes that it was possible for individuals to make. Four

Figure 1

Theoretical Space Occupied by Each of
Holland's Six Occupational Types



mutually exclusive types of change were of importance to Holland's theory. Any individual could have changed his or her vocational choice (a) to another vocation within the same major category, (b) to a vocation in an adjacent category, (c) to a vocation in a category that was neither adjacent to, nor across from the original category, or (d) to a vocation in the category that was directly across from the original category. Theoretically, this configuration ordered the vocational changes on a continuum that ranged from geometrically small changes to geometrically large changes. A fifth categroy was also included by grouping individuals who, on both the pre- and postmeasures, gave identical first vocational choices. In this manner a five-category indicator of change (dependent variable) was constructed. The five categories were labeled as follows:

1 = nonchangers

2 = within-class changers

3 = adjacent-class changers

4 = distant-class changers

5 = across-hexagonal changers.

Individuals were assigned to one of the above categories by comparing their fall, 1970, vocational choice with their spring, 1972, vocational choice. A total of 4,592 individuals were classified according to the indicator by a computer program that was written specifically for that purpose. Therefore, the reliability of the classification procedure was not a problem.

The sample. The sample for this study consisted of subjects who were drawn from a national sample of 2-year community-junior colleges and vocational-technical institutions. To be included in the sample, subjects must have met three criteria. First, they must have been a participant in the fall, 1970, norming of the CPP. Second, they must have returned a completed SCPP on or before May 5, 1972. This

was the end of the data-collection period. Finally, both their fall, 1970, expressed vocational choice and their spring, 1972, expressed vocational choice must have been included among the 91 occupations of interest (see Appendix B). As a result of the above-mentioned criteria the sample size was reduced from 4,592 to 4,406. Of those remaining, 55.7% were males and 44.3% were females.

A study of vocational choice changes requires that all individuals in the sample be specifically and correctly classified. Individuals who were undecided on, or did not respond to, either the pre- or postmeasures of expressed vocational choice were unclassifiable in terms of the dependent variable. Therefore, individuals of this "undecided--no response" type had to be excluded from the final sample. Application of the four previous sample selection criteria resulted in a final sample size of 2,928.

Individuals from a total of 62 institutions participated in the present study. Collectively, they represented a total of 33 states. Table 1 describes the composition of the final follow-up sample by regions of the United States. The southeastern and western regions were slightly overrepresented. It is important to note, however, that Florida and California are two of the leading states in the nation with regard to the development of community-junior colleges. Each is included in one of these regions. The high percentages reported for these two regions, therefore, are somewhat indicative of the actual distributions of these types of institutions and of students in vocational-technical programs in general.

Analysis. The data were first analyzed by comparing the proportions of each of the four types of change in each of the six major occupational categories. The purpose of these comparisons was to delineate patterns in the vocational choices of groups of individuals whose original vocational choices were in different major

Table 1

Composition of Final Follow-up Sample by Region of the United States

Region[a]	Number of institutions	Percent of total	Number of students	Percent of total
Eastern	10	16.1	381	13.0
Midwestern	7	11.3	429	14.7
Mountain-plains	7	11.3	294	10.0
Southeastern	17	27.4	848	29.0
Southwestern	4	6.5	355	12.1
Western	17	27.4	621	21.2
Total	62	100.0	2,928	100.0

[a]see Appendix E for a list of the states included in each region.

categories. Finally, a number of multiple discriminant function analyses were conducted. These analyses used the dependent variable (the vocational choice change indicator) as the criterion of group membership.

Discriminant function analysis is simply a statistical approach to the classification of individuals. Assuming that an individual has come from one of k populations, the method proceeds to describe how individuals, holding membership in different groups, differ from each other. Hopefully, groups tend to respond in meaningfully different ways to common measures or variables. A discriminant function

> maximally discriminates the members of the groups . . . . if we have two or more independent variables and the members of . . . two groups, the discriminant function gives the 'best' prediction, in the least-squares sense, of the 'correct' group membership of each member of the sample (Kerlinger, 1973, p. 650).

The problem is to determine which variables are useful for distinguishing between groups. The purpose of these discriminant analyses was to determine which, if any, of the 23 independent variables were useful, in a multivariate sense, for identifying those individuals who would later make some change in their vocational choice.

Results

Vocational choice changes were subdivided into four types using Holland's hexagonal model of vocational choice as the basis for classification. Each person's original vocational choice was classified into one of the six broad occupational types. The same classification was made of each person's follow-up vocational choice. These pairs of choices were then compared. This process identified the four types of changers--i.e., within-class changers, adjacent-class changers, distant-class changers, and across-hexagonal changers.

Of those who, in 1970, selected an occupation in one of the six major categories 55.1% changed their vocational choice during the 18-month period encompassed by this study. This is slightly higher than is commonly reported and may be primarily attributable to the fact that the majority of prior studies of the stability of vocational choice have covered shorter periods of time. In addition, the change indicator used in this examination required an individual to make exactly the same choice in order to be classified as a nonchanger.

Change rates for individuals whose 1970 choices were in different major categories exhibited considerable variation. Individuals in the Conventional or Social categories, both of which were dominated by females, exhibited the least amount of change--i.e. 43.7 and 39.3% respectively. Change rates for individuals in the Realistic, Investigative, Artistic, or Enterprising categories were 48.4, 51.5, 57.7, and 68.8%, respectively. With the exception of the Artistic category, each of these categories was dominated by males.

Table 2 presents the proportion of each type of change for males, for females, and for the combined final sample. Proportions relating to the vocational choice changes of males' decreased in a monotonic fashion from within- to across-hexagonal changes, while similar proportions for females exhibited a reversal of adjacent- and distant-class changes. There was also a reversal of adjacent- and distant-class changes when proportions were calculated using both sexes combined.

Table 3 presents proportions of each of the four types of vocational choice change for groups of individuals whose original (1970) vocational choice placed them in one of the six Holland occupation types. The female dominated categories--i.e. the Social and Conventional types--both exhibited reversals of adjacent- and distant-class changes. Changers originally in the Social category tended to stay in that category. Changers originally in the Conventional

Table 2

Vocational Choice Changes Based on Holland's Hexagonal Model and the Scott, 1973, Sample

Type of change	Proportion of total		
	Males	Females	Overall (males and females)
Within-class changers	43.5%	44.2%	43.8%
Adjacent-class changers	28.4	15.7	23.3
Distant-class changers	19.8	32.4	24.8
Across-hexagonal changers	8.3	7.7	8.1
N	903	595	1,498

Table 3

Vocational Choice Changes Based on Holland's Hexagonal Model by Fall, 1970, Occupational Type for the Scott, 1973, Sample

	Holland category					
	Real.	Inv.	Art.	Soc.	Ent.	Conv.
Within-class changers	58.5%	32.5%	43.3%	59.6%	22.0%	24.6%
Adjacent-class changers	24.5	34.8	20.6	13.9	12.9	19.6
Distant-class changers	13.2	22.6	33.0	22.9	41.7	43.5
Across-hexagonal changers	3.8	10.1	3.1	3.6	23.4	12.3
N	425	385	97	280	132	179

category tended to shift to occupations in either the Investigative or the Social categories--i.e. 43.5% made distant class changes. Changers originally in the Artistic category (this group had almost as many females as males) tended to shift to other Artistic occupations. Changers whose 1970 vocational choice was in the Enterprising category accounted for more across-hexagonal changes than did any other of the groups of individuals (24.5% of the individuals in this category shifted to an Investigative choice). Realistics, when they changed, tended to select other Realistic occupations. Changers who had originally chosen Investigative occupations accounted for more adjacent-class changes than did any other group. The recipient of most of these changes was the Realistic category.

Due to fact that sex differences in vocation related behavior has often been cited as being large, and since vocational opportunities are known to differ for males and for females, a presentation of vocational choice changes, by sex, was necessary. Table 4 presents these data. The difference between this table and the previous one is that the proportions presented in Table 3 for purposes of relating the results to the general population have been partitioned to show the differences in the behavior of this sample's males and females.

The statistical significance of the difference between the proportions of male changers and of female changers in any of the four types of change was determined by a standard test of the difference between two independent proportions (Ferguson, 1971). A z-test was conducted for every cell percentage difference between males and females. Since the four tests in any of the columns were not independent, the .05 level of significance was conservatively estimated by using as a critical z the value of ± 2.50 rather than the more commonly used, and less conservative, z value of ± 1.96. These new z scores

Table 4

Vocational Choice Changes by Sex and
Based Upon Subject's Fall, 1970
Occupational Type

Type of change		Holland category					
		Real.	Inv.	Art.	Soc.	Ent.	Conv.
Within-class changers	males	59.9*	33.3	40.3	22.7*	23.1	3.7*
	females	21.4	30.0	47.5	62.7	17.9	28.3
Adjacent-class changers	males	24.5	43.6*	14.0	18.2	5.8*	51.9*
	females	21.4	10.7	30.0	13.6	39.3	13.8
Distant-class changers	males	12.7	12.1*	43.9*	31.8	48.1*	40.7*
	females	28.6	51.5	17.5	22.1	17.9	44.1
Across-hexagonal changers	males	2.9*	11.0	1.8	27.3*	23.0	3.7
	females	28.6	7.8	5.0	1.6	24.9	13.8
Male N		411	282	57	22	104	27
Female N		14	103	40	258	28	152

*Difference between proportions is significant at the .05 level.

were computed by dividing the .05 α by four, and then, using as the new critical z the value which corresponded to the adjusted α level. Therefore, the apparent α was .0125 but the original α of .05 actually remained "relatively" unchanged. Differences which produced significant z values are designated by an asterisk (*) following the pairs of proportions.

Examination of Table 4 reveals that there were a large number of substantial differences between male and female changers whose 1970 vocational choices had been in the same major category. One-half of the cells, using a conservative method of establishing the significance of the differences between the proportions, showed significant differences. This indicates that there were, for all types of change, wide differences between the sexes in patterns of vocational choice changes.

The utility of 23 independent variables for discriminating between nonchangers and changers was also examined. The analyses consisted of a total of six multiple discriminant function analyses. Each of the three pairs of analyses was comprised of a validation run and a cross-validation run. Each of these runs utilized one-half of the available cases.

The highest cross-validation hit rate was obtained for male changers using interest measures (79.1% correct classifications). The lowest cross-validation hit rate was obtained for male nonchangers using ability measures (22.4% correct classifications). When both sexes were combined, four variables (sex, clerical competencies, art competencies, and trade interests) produced F - ratios which were significant at the .05 level. When only males were included in the analyses three variables (clerical competencies, clerical skills, and business contact interests) produced F - ratios which were significant at the .05 level. When only females were included in the analyses four variables (clerical competencies,

art competencies, science competencies, and mechanical skills) produced F - ratios which were significant at the .05 level.

Wilks' Lambda has been defined as representing a test of the power of discrimination for a battery of predictors. It reflects the ratio of within-group variance to total-group variance. It ranges from .00 to 1.00. The nearer Lambda is to zero, the greater the discriminating power of the battery (Cooley & Lohnes, 1971). Table 5 presents Wilks' Lambdas for each of the aforementioned discriminant analyses. Lambdas are also presented for two additional discriminant analyses which were run separately, for each sex, using as independent variables only those variables which produced significant F - ratios. In both cases, the "combination" analyses produced higher Lambdas than the already high non-combination Lambdas. This suggests that the inclusion of a number of variables with nonsignificant F - ratios was not detrimental to group discrimination, as is often the case. Apparently, even the variables with F - ratios that were not large enough to be significant at the .05 level, were of some value for purposes of group differentiation.

In a multivariate sense, the 23 independent variables examined in the present investigation were not particularly useful for discriminating between nonchangers and changers. Wilks' Lambdas ranged from .95 to .98. Lambdas within this range indicate that nonchangers and changers did not differ much in terms of the predictor variables examined.

On both the validation and cross-validation analyses males were more likely to be classified into the changer category than were females. This was simply because males were more likely to change their choice, at some point during the 18-month period studied, than were females. Of the 1,614 males in the final

Table 5

Wilks' Lambdas for Each of the 2 - Group Discriminant Analyses

Discriminant analysis	Wilks' Lambda
Males (ability)	.97
Males (interest)	.97
Males (combination)	.98
Females (ability)	.96
Females (interest)	.95
Females (combination)	.97
Total group (ability)	.96
Total group (interest)	.96

sample 903, or 55.9% changed their vocational choice. Of the 1,314 females in the final sample 595, or 45.3% changed their vocational choice.

For females, the nonacademic competencies contributed more to group differentiation than did either the ability or the interest measures. The first three variables entered, in both the female ability measure and the female interest measure discriminant analyses, were science, clerical, and art competencies. For males, the pattern was much more diffuse. The first three variables entered in the male ability measure discriminant analysis were clerical competencies, father's level of education, and numerical computation. The first three variables entered in the male interest measure discriminant analysis were business contact interest, clerical competencies, and father's level of education.

In general terms, clerical competencies were the most useful of the variables; this variable was consistently entered either first or second in each of the male and each of the female discriminant analyses. For the males, it should be noted that father's level of education was of some discriminating value. While its F - value was not significant, at the .05 level, in either of the male analyses, it was entered second in the ability analysis and third in the interest analysis. Mother's level of education was also somewhat useful in the female discriminant analyses; this variable was entered fifth in their ability analysis, and sixth in their interest analysis. Apparently, parental level of education provided information that was different from the information provided by some of the other, more conventional variables.

The seven independent variables whose nonchangers and changer group means were significantly different at the .05 level were cross-tabulated to determine the location of the differences, by sex, in each variable's distribution. Two ability measures (clerical and mechanical skills), three nonacademic or career-related competencies (art, business detail, and science competencies), and two

interest measures (business contact and trade interests) were examined. The statistical significance of the difference between the proportions of non-changers and changers, in each of the above-mentioned variable's categories or intervals, was determined by a standard test of the difference between two independent proportions (Ferguson, 1971). Nonchanger-changer proportions did not significantly differ for clerical skills, mechanical skills, or art competencies. A total of seven cells in the other four variable's cross-tabulations produced statistically different proportions.

Discussion

Male changers tended to (a) report more business detail competencies, and (b) score slightly higher on trade interests than male nonchangers. Female changers tended to (a) report fewer science competencies, and (b) score slightly higher on business contact interests than female nonchangers. Aside from these few minor differences, nonchangers did not differ greatly from changers in terms of the independent variables examined in the present study.

The transition from school to work is one that should be relatively easy for an individual to make. However, unless the individual has access to relevant career information, the transition period may not only be difficult, but it may also result in a final placement that is, from the individual's perspective and from the employer's perspective, less than optimal. The individual must have some realistic conceptions about important variables which are likely to influence both the long- and short-term consequences of his decision-making endeavors. The problem which faces career development theorists and practitioners is that of defining avenues through which all types of individuals may easily become informed about the world of work.

Two major findings emerged from this investigation that may be of use in answering the above-mentioned theoretical and practical concerns. The first relates to vocational choice patterns. Variations were noted in the types of vocational choice change exhibited by individuals' whose original choices were in different major categories. In addition, of the 1,498 individuals who changed major categories 30.0% changed to the Realistic category, 22.5% changed to the Investigative category, and 19.7% changed to the Social category. The other three occupational groups each received less than 10% of the changers. The second finding was that changers differed very little from nonchangers in terms of the 23 interest, ability, and familial background variables examined. This suggests that when individuals changed their vocational choices they did so not so much because they differed from those who typically kept the same vocational choices, but because of some other factor(s). Perhaps change resulted when an individual developed cognitive dissonance from a personally unsatisfactory original vocational choice. Perhaps some other choice simply became more attractive. Perhaps the individual's perception of employment possibilities changed significantly. In any case, from these data it was clear (a) that changers were very similar to nonchangers, (b) that the behavior of males and females' differed, and (c) that group's vocational choice change patterns differed from one major vocational type to another.

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Appendix A

CPP Norm Group Institutions That Participated in the Spring, 1972, Follow-up Sorted Alphabetically by State and by Institution, Listing by Institution the Number of Students in the CPP Norm Group, the Number of Responders, and the Number Included in the Final Sample

Institution	# in Norm Group	# of Responders	# in Final Sample
Jefferson State Junior College Birmingham, Alabama	770	170	103
Anchorage Community College Anchorage, Alaska	76	16	10
Central Arizona College Coolidge, Arizona	209	36	20
College of the Siskiyous Weed, California	36	11	9
Gavilan College Gilroy, California	83	24	13
Modesto Junior College Modesto, California	190	83	58
Pasadena City College Pasadena, California	91	56	40
Santa Barbara City College Santa Barbara, California	38	29	24
Santa Rose Junior College Santa Rosa, California	312	94	54
West Hills College Coalinga, California	80	34	18
Aims Junior College Greeley, Colorado	81	32	20
Community College of Denver - Red Rocks Campus, Lakewood, Colorado	179	63	39
Brewster Adult Technical School Tampa, Florida	123	65	33
Lake - Somter Community College Leesburg, Florida	42	12	10
Manatee Junior College Bradenton, Florida	106	31	19
Okaloosa - Walton Junior College Niceville, Florida	49	11	9
Palm Beach Junior College Lake Worth, Florida	389	197	136

Appendix A (con't)

Institution	# in Norm Group	# of Responders	# in Final Sample
Pinellas Technical Education College Clearwater, Florida	350	94	52
St. Johns River Junior College Palatka, Florida	49	10	7
St. Petersburg Junior College Clearwater, Florida	143	62	45
Sheridan Vocational Center Hollywood, Florida	468	134	88
Valencia Community College Orlando, Florida	79	34	18
Leeward Community College Pearl City, Hawaii	1,611	433	198
North Idaho College Coeur D'Alene, Idaho	437	134	87
Carl Sandburg College Galesburg, Illinois	363	68	52
Parkland College Champaign, Illinois	310	115	81
Kirkwood Community College Cedar Rapids, Iowa	244	113	73
Hutchinson Community Junior College Hutchinson, Kansas	151	66	44
Kansas Technical Institute Salina, Kansas	38	14	10
Somerset Community College Somerset, Kentucky	177	37	27
Allegany Community College Cumberland, Maryland	64	33	27
Catonsville Community College Catonsville, Maryland	332	124	103
Frederick Community College Frederick, Maryland	57	25	17
Kellogg Community College Battle Creek, Michigan	48	19	13
Anoka-Ramsey State Junior College Coon Rapids, Minnesota	26	16	14
Jones County Junior College Ellisville, Mississippi	274	74	35
Flathead Valley Community College Kalispell, Montana	116	20	9

Appendix A (con't)

Institution	# in Norm Group	# of Responders	# in Final Sample
Western Nevada Community College Carson City, Nevada	57	11	7
Camden County College Blackwood, New Jersey	75	31	21
Ocean County College Toms River, New Jersey	44	18	12
Union County Technical Institute Scotch Plains, New Jersey	334	122	83
New Mexico Junior College Hobbs, New Mexico	128	37	22
State University of New York Agriculture & Technical College Alfred Campus, Alfred, New York	221	42	32
Catawba Valley Technical Institute Hickory, North Carolina	386	138	96
Lenoir Community College Kinston, North Carolina	205	84	58
North Dakota State School of Science Wahpeton, North Dakota	553	243	147
Michael J. Owens State Technical College - Perrysburg, Ohio	207	83	50
Oklahoma State University Technical Institute - Stillwater, Oklahoma	864	429	284
Portland Community College Portland, Oregon	83	25	11
Delaware County Community College Media, Pennsylvania	140	54	42
Montgomery County Community College Blue Bell, Pennsylvania	50	23	18
Piedmont Technical Education Center Greenwood, South Carolina	191	83	50
York Technical Education Center Rock Hill, South Carolina	268	95	62
San Antonio College San Antonio, Texas	240	48	29
Utah Technical College at Salt Lake Salt Lake City, Utah	141	45	25
Bellevue Community College Bellevue, Washington	26	5	2

Appendix A (con't)

Institution	# in Norm Group	# of Responders	# in Final Sample
Columbia Basin College Pasco, Washington	78	25	18
Everett Community College Everett, Washington	182	66	39
Green River Community College Auburn, Washington	86	36	19
Yakima Valley College Yakima, Washington	68	22	14
Potomac State College Keyser, West Virginia	53	36	26
Milwaukee Area Technical College Milwaukee, Wisconsin	488	202	146

Appendix B

Original Occupational Programs and Corresponding Number of Responders From Which the Final Sample was Selected

Occupational programs	Number in program
Trade and Industrial Fields	80**
Agricultural mechanics	12
Air-conditioning, refrigeration, or heating mechanics	134
Appliance repair	3
Automotive body repair	59
Automobile mechanics	263
Business machine maintenance	6
Construction & maintenance trades	15
Data systems repair	24
Drafting	166
Electrical fields (excluding technology)	46
Electronics (excluding technology)	94
Graphic arts (printing, linotype, etc.)	14
Laundry, dry cleaning, etc.	1
Leatherworking (shoe repair, etc.)	3
Machinework (tool & die, etc.)	48
Metalworking	24
Plumbing or pipefitting	6
Radio-TV repair	0*
Small engine repair	5
Upholstering	3
Watch repair & other instrument maintenance & repair	9
Welding	0*
Woodworking (cabinetmaking, millwork)	5
Other trade and industrial fields	7
Technical Fields Agricultural Production	
Farming, ranching	87
Forestry	61
Horticulture	0*
Soil conservation	2
Wildlife management	29
Other agricultural applications	13

Appendix B (con't)

Occupational programs	Number in program
Engineering technology--aeronautical	5
Engineering technology--automotive	6
Engineering technology--civil	31
Engineering technology--electrical/electronic	173
Engineering technology--industrial/ manufacturing	13
Engineering technology--mechanical	27
Natural Science Fields	
Biological sciences	9
Mathematics	8
Physical science	50
Arts and Humanities Fields	
English & literature	6
Journalism	13
Music	23
Philosophy, theology/religion	9
Other arts & humanities	74
Arts & sculpture	26
Commercial art	35
Commerical photography	11
Interior decorating	0*
Radio-TV/broadcasting	20
Health Fields	
Advanced medical fields (dentistry, medicine, optometry, radiology, etc.)	34
Dental assisting	118
Dental hygiene	86
Dental lab technology	34
Dietitian	0*
Dietetic technology	0*
Environmental health technology	10
Medical assisting	77
Medical technology	65
Mental health technology	23
Nursing (practical)	160

Appendix B (con't)

Occupational programs	Number in program
Nursing (registered)	355
Occupational/physical therapy	17
Occupational/physical therapy aide	12
Radiological & x-ray technology	43
Social Science and Public Service Fields	
Barber	0*
Beautician or cosmetologist	36
Child care aide	0*
Community service work	34
Fireman	57
Food service (baker, cook, waitress)	9
Home economics (occupational)	19
Housewife (homemaker)	22
Law (professional degree)	37
Physical education & recreation	33
Police science	67
Stewardess	0*
Teacher aide	18
Business Contact and Marketing Fields	
Advertising services	25
Agricultural business	45
Business administration	69
Department store marketing	12
Finance, credit, insurance	7
Food marketing	10
Hotel, motel, restaurant management	31
Real estate	9
Recreation & tourism	18
Sales & retailing	37
Business Detail and Office Fields	
Accounting	141
Computer programming	159

Appendix B (con't)

Occupational programs	Number in program
Data processing	129
Office management	71
Office machines & procedures	43
Secretarial science	350
Total	4,282**

*These programs were added on the follow-up questionnaire. Therefore, no individuals were originally in the program, but some later indicated these options as their first vocational choice.

**Three hundred and ten individuals were eliminated from the final sample, either because they were originally undecided or because their original program was not of interest in the present study. Inclusion of these individuals would have resulted in the total N of 4,592.

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